

# Determinant of Milk Market Outlet Choices: The Case of Kofele District, West Arsi Zone, Oromia, Ethiopia

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## Abstract

The study was aimed at Determinant of milk market outlet choices Kofele district, West Arsi Zone, Oromia Ethiopia with the specific objectives of identifying factors affecting milk market participation decision and the level of participation of milk. Data for this study were collected from both primary and secondary sources. Primary data were collected from 142 farmers, 59 traders, 2 cooperatives and 23 consumers. A primary data was collected from the milk value chain actors using semi-structured questionnaires, key informants, and focus group discussion guide checklist. to analyze the determinants of the producers market participation decision and level of participation double hurdle model was applied. Multivariate probit model used to identify the determinants of market outlets choice decisions. The multivariate probit model results indicated that sex, dairy farming experience, dairy cooperative membership, number of milking cow owned frequency of extension contact, off/non-farm income and access to transportation facility of farm households were significantly influenced milk producers' choice of market outlets.

**Keywords:** Milk, Market outlet, Multivariate probit

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## INTRODUCTION

Ethiopia holds large potential for dairy development particularly Ethiopian highlands possess a high potential for with diverse topographic and climatic conditions favorable for dairying (Gezu and Zelalem, 2018). The traditional smallholder milk production system produces 97 percent of the total national milk production and 75 percent of the commercial milk production. This sector is largely dependent on indigenous breeds of low-productivity native zebu cattle, which produce about 400-680 kg of milk /cow per lactation period (Zelalem *et al.*, 2011). As dairying play a significant role in the lives of the urban and peri-urban poor households, promotion of the dairy sector in Ethiopia can, therefore, contribute significantly to poverty alleviation as well as, availability of food and income generation (Yitaye *et al.*, 2007). In addition, a very small number of crossbred animals are milked to provide the family with fresh milk butter and cheese (Getachew, 2015). Surpluses are sold, usually by women, who use the regular cash income to buy household necessities or to save for festival times (Mugerewa *et al.*, 2009).

Despite a large number of livestock and dairy production in Ethiopia, there are a number of fundamental constraints underly these outcomes. Berhanu *et al.* (2013) study on factors affecting milk market outlet choices in Wolaita zone, Ethiopia, include poor marketing infrastructure, limited supply of different inputs (feed, breed, stock, and water), poor or non-existent of extension service, lack of marketing support service, high diseases prevalence, lack of market information, traditional technologies and limited credit services affect the livestock marketing conditions.

The application of value chain analysis in agriculture is a solution to market failure and non-competitive setting of small-scale agricultural production. Value chain and innovations are also interlinked. Improvement in productivity and competitiveness of the value chain is the litmus test for value chain innovation (Anandajayasekaram and Gebremedhin, 2009).

Accordingly, Producers' knowledge of alternative sales outlets and of prices they offer was, generally, enhance their bargaining position and improve their chances of getting the highest prices for their products. Producers were also have the flexibility to shift between outlets to obtain the best prices. The factors affecting the selection of milk sales outlets are the distance from the market, price, dairy extension service, market information (Berhanu *et al.*, 2013). About 48% of urban producers consider proximity and better price while selecting sales outlets. The majority of the urban producers (71.2%) sell directly to consumers. Contrary to this, peri-urban producers (62%) mainly supply to processors. The major actors in the milk marketing value chain are producers, vendors, processors, wholesalers, retailers, catering enterprises and consumers. Recently, vendors have become collectors of raw milk from farmers and deliver to processors at factory gates (Azage *et al.*, 2013).

In Oromia regional state, agriculture remains to be the dominant economic sector. In 2018, the region has a total of 24,432,974 cattle and 40.9% (9,995,854) are milking cows, total milk produced in a region is 1,473,195,406 Lts. It has the highest share (44.42%) milk production from the rest of eight region and Average Daily milk produced is 1.475 which is greater than the national level of the country (CSA, 2018). Similarly, West Arsi Zone is well known in milk production. Wytze *et al.* (2013) reviewed west Arsi zone (kofele, Dodola, and

Arsi Nagele) are the most milk shed district.

Kofele district, where the study focused, is endowed with suitable for livestock and dairy production. Most farmers in the area produce milk for home consumption, in the form of raw milk and *ergo*. Still, most of the milk sold to the market, after deducting the needed for home consumption and buying for grass or feed (cost of feeding). As such, milk plays an important role in generating cash income in the area. According to the KDLFDO (2018), the annual production was 26.9 million liters of milk at an average of 2.8 liters/ cow from 26,252 current milking cow.

However, determinant of milk market outlets choices have not yet been studied and analyzed for the target study area, where great potential of milk production exists. Therefore, this study aims at analysis of milk outlets choices determinant in Kofele district.

## METHODOLOGY

This study was undertaken in kofele district of Oromia regional state of southern Ethiopia, which has been potential in the production of milk. Kofele is one of the districts in the Oromia Region of Ethiopia. The study area has good climatic conditions and this is an opportunity for rearing dairy cows. The agro ecology of the area is tepid to high land (91%) and Midland (9%). The elevation of the area ranges between 1040 - 3574 masl. The mean annual temperature ranges from a minimum of 15°C to an average annual maximum of 25°C and the annual rainfall varies between 800-1200mm and rainfall starts in June and ends in October (KDANRM, 2019).

Kofele district has various land use types that could be classified into arable land, grazing land and forestland. The district has a total area of 32835 ha of which 9534.57 ha arable land, 7721 ha grazing land, and 4405.5 ha forestland (KDANRM, 2019).

The district has 38 rural Kebele and 3 towns and all of them participate in milk production. The 2007 national census reported a total population of the district to be 105,614 people, of whom 52,888 were male and 52,726 were female. It is the area where livestock farming is an important component of the farming system and one of the high actual productivity areas for milk production in the district. The district also endowed with a significant number of domestic animals; 97,560 cattle, out of which 89,240 indigenes cattle 8320 are crossbred, 39,206 sheep, 2107 goats, 229 equines, 75,450 poultry, and 5786 honeybee colonies are found in the district (KDLFDO, 2019). Milk production in the district was 74,986 liter of milk produced per day or 2.25 million liter of milk per month or 26.9 million liters of milk per annual from 26,252 milking cow comprising of 23,913 local and 2339 cross milking cow. The proportion of local and cross milking cow breed is 91.1% and 8.9%, respectively (KDANRM, 2019).

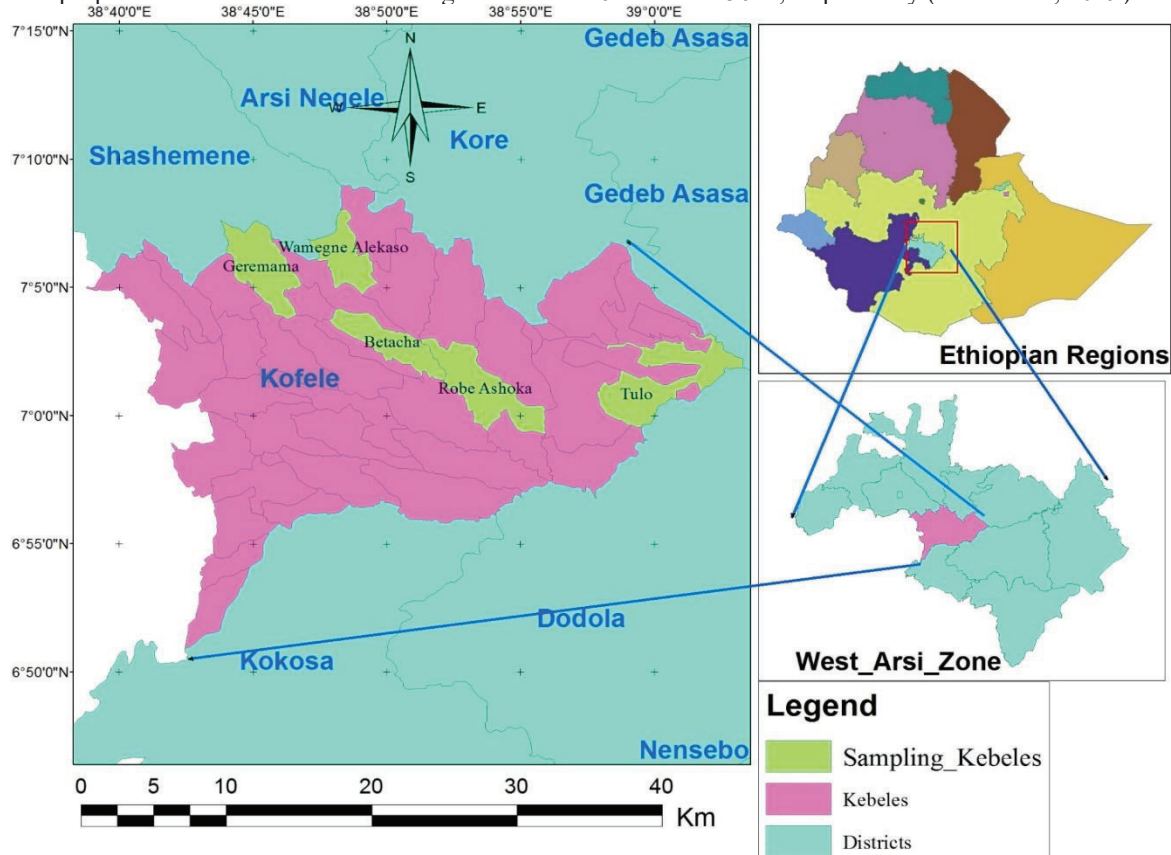


Figure 1: Geographical location of the study area.

Source: Own sketch using Geographical Information System (GIS) (2019)

### Type, Source and Method of Data Collection

Both primary and secondary as well as quantitative and qualitative data were used for this study. Primary data was obtained from milk producers, rural milk collectors, Dairy cooperatives, café/hotel, and consumers. Secondary data was obtained from different literatures such as books, journals, research reports, different unpublished reports and documents, Central Statistical Authority (CSA) and internet websites.

A primary data was collected from the milk value chain actors using semi-structured questionnaires', key informants, and focus group discussion guide checklist. A total of five focus group discussions involving 8-10 members in each group were held in selected *kebeles* to collect the relevant data for the study. Before conducting the final survey, Rapid Market Appraisal (RMA) was undertaken to have some picture on the marketing system of milk. Five of enumerators were recruited and trained for data collection.

### Sampling Procedure and Sample Size Determination

Two-stage sampling procedure was used to draw a representative sample of milk value chain actors from the target population in the study district. In the first stage, stratified sampling technique was implemented in order to come up with homogenous *kebeles*. 41 (Forty one) *kebeles* of the study area were classified into two: that is high 14 (fourteen) and low 27 (twenty seven) milk producer *kebeles* based on their existing milk production level and market access via the list provided by District Offices of Livestock and Lishery Development. Then, 5 (five) sample *kebeles* of the district was selected randomly out of 14 (fourteen) high milk producer *kebeles*. In the second stage, a total of 142 households were selected randomly from these 5 selected *kebeles*, using probability proportionate to size of milk producer households in the *kebeles*. The sample size was determined based on the formula given by Yamane (1967) at 92% confidence level and error term 8%.

$$n = \frac{N}{1 + Ne^2} \quad \text{Where } n = \text{is sample size} \quad (1)$$

N = is number of milk producer households' in the selected *kebeles* which is 1558

e = is error term 8 % (0.08)

The total sample size:  $n = \frac{1558}{1 + 1558 \times (0.08)^2} = 142.01 \sim 142$

Therefore, a total of 142 milk producing farm households was taken as samples to conduct this study.

Table 1: Sample of selected district's *kebeles* milk producing households

Name of the <i>kebele</i>	Milk producer households			Proportionality	Sample
	Male	Female	Total		
Robe Ashoka	304	34	338	0.22	31
W/Halkaso	257	20	277	0.17	25
Tulo	327	24	351	0.23	32
Bitacha	284	19	303	0.20	28
Garmama	263	26	289	0.18	26
<b>Total</b>	<b>1435</b>	<b>123</b>	<b>1558</b>	<b>1.00</b>	<b>142</b>

Source: own computation from KDALFO 2019

In addition, to producers the value chain actors like, dairy cooperative, collectors, retailer, and cafes/hotel were selected on the basis of their size and availability. Accordingly, 2 dairy cooperative, 5 collector, 23 cafes/hotel, and 12 retailer were selected census based on the list of licensed traders information obtained from kofele district office of Trade and Industry. However, from Shashamane city cafes/hotel and retailer were selected by follow footstep of product flow in the channels. Accordingly, 11 cafes/hotel owner and 8 retailers were selected by taking information from cooperative and collector interview of the kofele district where they sell. Furthermore, 14 consumers were interviewed from kofele district and 9 consumer from Shashamane city, which were selected a purposively to obtain information related to consumers

### Method of Data Analysis

Two types of data analysis, namely descriptive statistics and econometric models was used to analyze the data collected from the households. Descriptive method of data analysis includes the use of percentages, means and standard deviations. Econometric model was used to analyze determinant of smallholder milk producer households milk market outlet choice using multivariate probit model.

### Modeling choice of channel

The choice of marketing outlet was based on producers' socio-economic characteristics and relevant factors influencing the choice imbedded in each channel. The base for market channel choice is the theory of rational choice which assumes that farmers are rational and would rank alternative marketing outlet for utility maximization.

The producers' market outlet choice can be conceptualized using a Random Utility Model. The model is particularly applicable for modeling discrete choice decisions such as market outlet choices. It is an indirect utility function where an individual with specific characteristics associates an average utility level with each alternative outlet in a choice set (Tarekegn *et al.*, 2017).

Multinomial models are applicable if marketing channels are mutually exclusive and farmers can choose one best channel as their market outlet (Zegeyesh, 2016). However, in the study area, smallholder milk producers face different choices of market outlets like: dairy cooperative, collector, retailer and consumers. Thus, in this study since milk is one of the income-generating commodity that enables producers to choose more than one outlets that are not mutually exclusive to get better price. Considering the possibility of simultaneous choices of outlets and the potential correlations among these market outlet choice decisions multivariate probit model (mvprobit) was appropriate and applied to capture household variation in the choice of market outlets and to estimate several correlated binary outcomes jointly.

Multivariate probit approach simultaneously models the influence of the set of independent variables on choice of market channels, while allowing for the potential correlations between unobserved disturbances, as well as the relationships between the choices of different market channels (Belderbos *et al.*, 2004).

The observed outcome of market channel choice can be modeled following random utility formulation. Consider the  $i^{\text{th}}$  farm household ( $i=1, 2, \dots, N$ ) facing a decision problem on whether or not to choose available market. Let  $U_0$  represent the benefits to the farmer who chooses dairy cooperative, and let  $U_k$  is represent the benefit of farmer to choose the  $K^{\text{th}}$  market choice: where  $K$  denotes choice of dairy cooperative ( $Y_1$ ), collectors ( $Y_2$ ), retailers ( $Y_3$ ), and individual consumer ( $Y_4$ ). The farmer decides to choose the  $K^{\text{th}}$  market choice if  $Y_{ik}^* = U_k^* - U_0 > 0$ . The net benefit ( $Y_{ik}^*$ ) that the farmer derives from choosing a market choice is a latent variable determined by observed explanatory variable  $X_i$  and the error term ( $\epsilon_i$ ).

$$Y_{ik}^* = X_i\beta_k + \epsilon_i \quad k = Y_1, Y_2, Y_3 \text{ and } Y_4 \quad (1)$$

Using the indicator function, the unobserved preferences in equation (1) translates into the observed binary outcome equation for each choice as follows:

$$Y_{ik} = \begin{cases} 1, & \text{if } Y_{ik}^* > 0, \\ 0, & \text{otherwise} \end{cases} \quad k = Y_1, Y_2, Y_3 \text{ and } Y_4 \quad (2)$$

In multivariate model, where the choice of several milk market choice is possible, the error terms jointly follow a multivariate normal distribution (MVN) with zero conditional mean and variance normalized to unity for identification of the parameters where  $\mu_{y1}, \mu_{y2}, \mu_{y3}, \mu_{y4}$   $MVN \sim (0, \Omega)$  and the symmetric covariance matrix  $\Omega$  is given by:-

$$\Omega = \begin{bmatrix} 1 & \rho_{y1y2} & \rho_{y1y3} & \rho_{y1y4} \\ \rho_{y2y1} & 1 & \rho_{y2y3} & \rho_{y2y4} \\ \rho_{y3y1} & \rho_{y3y2} & 1 & \rho_{y3y4} \\ \rho_{y4y1} & \rho_{y4y2} & \rho_{y4y3} & 1 \end{bmatrix} \quad (3)$$

Of particular interest are off-diagonal elements in the covariance matrix, which represent the unobserved correlation between the stochastic components of the different type of choice. This assumption means that equation (21) generates a MVP model that jointly represents decision  $\mu$  to choice particular market choice. This specification with non-zero off-diagonal elements allows for correlation across error terms of several latent equations, which represents unobserved characteristics that affect the choice of alternative outlets (Tarekegn *et al.*, 2017).

Following the form used by Cappellari and Jenkins (2003), the log-likelihood function associated with a sample outcome is then given by:

$$\ln L = \sum_{i=0}^N \omega_i t \Phi_i(\mu_1, \Omega) \quad (4)$$

Where  $\omega$  is an optional weight for observation  $i$ , and  $\Phi$  is the multivariate standard normal distribution with arguments and  $\Omega$ , where  $\mu_i$  can be denoted as:-

$$\mu_i = k_{i1}\beta_1 X_{i1}, k_{i2}\beta_2 X_{i2}, k_{i3}\beta_3 X_{i3}, \quad \text{while } \Omega_{ik} = 1 \text{ for } j = k \quad (5)$$

$$\Omega_{jk} = \Omega_{kj} = k_{ij}k_{ik}\rho_{jk} \text{ for } j \neq k, k = 1, 2, 3 \dots \text{ with } k_{ik} = 2k_{ik} - 1 \quad (6)$$

## Dependent variables

**Market outlet choice:** Market outlet choices was dummy variable and it took 1 if producers' choice was  $i^{\text{th}}$  outlet choice and zero otherwise. Each sampled household would use one or more marketing outlet. A sampled household would be choosing one or more of the milk market outlet if and only if the utility expected is higher than otherwise.

Table 2: Variables affect market outlet choice

No	Variable	Variables symbols	Measurement	outlet choice
1	Sex of the household head	SEXH	Dummy:1=if male;0=otherwise	±
3	Educational level of household	EDLH	Category; 0 if do not follow formal school, 1primary, 2 secondary, 3tertiary and above.	±
	Dairying farm experience	EXMP	Continuous; in a year	±
4	Family size	FAMSH	Continuous; in number	±
5	Membership to dairy cooperative	MDCOP	Dummy:1=if male;0=otherwise	±
6	Distance from the nearest market	DNM	Continuous; kilometer	±
7	Number of milking cows owned	NMCO	Continuous;No.	±
8	Milk allocated for home consumption	MAHCON	Continuous;Liters	±
9	Land size allocated for grazing	LAND	Continuous; in hectare	±
10	Off/non-farming income	OFFARM	Continuous; measured in Birr.	±
11	Frequency of extension contact	FEC	Continuous; number of a day contact	±
12	Transport ownership facility	TOF	Dummy:1= uses transp 0=otherwise	±

Source: Own hypothesis based on review of literature (2019)

## RESULTS AND DISCUSSIONS

### Milk Marketing Outlets

The sampled households were asked if they choose different milk market outlets to maximize the profit from their outlet choice decision. Accordingly, they reported that different milk market outlets were used to sale their milk produced. These milk market outlets include cooperatives, collectors, retailers, and consumers. These outlets are mostly chosen in combination with one another. Table 3 shows the different milk market outlets used by the milk producer when selling their milk. One of the most commonly used market outlets by producers is the retailer outlet which was chosen by about 48.59% respondents with mean supply of 3.93 liters/day. However, is statically insignificant between household who select retailer outlet and do not choice. About 42.25%, 40.68% of respondents sold to cooperative and collector with mean supply of 3.86 liter/day and 3.4 liter/day, respectively and both of them were statically significant difference between household who choice cooperative and collector and who do not choice them at 5% significant level. As consumers are also a common milk marketing outlet in the study area, around 38.03% of sample households sold to the collectors with mean supply of 3.42 liters and it is statistically significant at 5% level.

Table 3: Description of milk market outlets

	cooperative	Collectors	Retailers	consumers
Decision	percent	percent	percent	Percent
Yes	42.25%	40.68%	48.59%	38.03%
No	57.75%	59.32%	51.41%	61.97%
Chi-square	11.1664**	7.0900**	3.6271	10.1016**
Supply to each outlet	Mean	Mean	Mean	Mean
	3.86	3.4	3.93	3.42

Note: \*\* is statistically significant at 5% significance level

Source: Computed based on survey data, 2019



### Determinant of Milk Producers' Market Outlet Choice

The expected multivariate interdependence of choice of the specific market outlet of collectors, dairy cooperatives, retailer, and consumers were computed by employing the multivariate probit model (Table 4).

The model fits the data reasonably well. The Wald chi-square statistic ( $\chi^2(56) = 183.34, p = 0.000$ ) that helps to test for the overall significance of the model is significant at 1% probability level. This result infers that of coefficients are jointly significant and the explanatory power of the factors included in the model is satisfactory. The likelihood ratio test of the null hypothesis of independence between the market channel decision ( $\rho_{21} = \rho_{31} = \rho_{41} = \rho_{32} = \rho_{42} = \rho_{43} = 0$ ) is significant at 1%. Therefore, the null hypothesis that the  $\rho$  (Rho) values are jointly equal to zero is rejected, indicating the goodness-of-fit of the model (Table 18).

Separately considered, the  $\rho$  values ( $\rho_{ij}$ ) indicate the degree of correlation between each pair of dependent variables. The  $\rho_{21}$  (correlation between the choice of collector and cooperative outlet),  $\rho_{31}$  (correlation between the choice of retailers and cooperative outlet) is negative and statistically significant at 1% significance level; and  $\rho_{42}$  (correlation between the choice of consumer and collector outlet) are positive and statistically significant at 5% level. This result indicates that farmers selling their milk production to the cooperative outlets are less likely to deliver to retailers and collectors outlets. Similarly, those farmers marketing milk to the consumer outlet are less likely to deliver to collectors market outlets (Table 4).

The simulation results also indicate that the marginal success probability for each equation (outlet choice decision) is reported below. The likelihood of choosing consumer outlet is relatively low (43%) as compared to the probability of choosing cooperative outlet (45%), collector outlet (44%) and retailer outlet (45%). This is an indicator that retailer is the most likely chosen market outlet by farmers and the low capacity of consumer outlet to purchase more milk product at a time and the remoteness of producers from urban consumers outlet. The joint probabilities of success or failure of choosing four outlets suggests that the likelihood of households jointly choose the four outlets is low. The likelihood of households jointly choose the four outlets was 3%, which is relatively lower to their failure jointly choose them (8%). The result in Table 4, indicated that out of explanatory variables used in the multivariate probit model, sex of household, dairy farming experience, land size allocated for grazing and membership to a dairy cooperative. Moreover, the number of milking cows owned, and Off/non-farm income household, Frequency of extension contact, and Transport ownership facilities were found to significantly affect the market outlet choice behavior of milk producers.

**Sex of household (SEX):** Sex (male) was negatively and significantly associated with the use of collector outlet at 5% significance level while household sex (male) was positively and significantly associated with the use of retailer outlet at 10% significance level. It is also interesting to note that male head producers are less likely to deliver milk to the collector outlet than female head household. Females as head of the household are confronted with the household roles and therefore they do not select other market outlets because it requires moving out of the homestead to the point of buyers. This is a line with kadigi (2013) found that positive and significant relationship between being a female dairy farmer and the likelihood to choose vendors/local collector as milk market outlet mean that, the female-headed dairy household would increase the probability for marketing milk to milk vendors.

**Dairy farming experience** has a significant and positive relationship with the likelihood of choosing dairy cooperative and consumers' market outlet at 10% and 5% significant level, respectively. This result shows that an increase in farmers' experience increases the likelihood of selling milk to choosing dairy cooperative and consumer market outlets. The possible explanation might be that older producers prefer selling for cooperative and consumers who buy on a cash basis at the farm gate than other outlets. Similar to this result, Berhanu *et al.* (2013) found that a number of years a household has been in dairy farming positively and significantly affected accessing cooperative milk market outlet as compared with accessing individual consumers outlet.

Table 4: Multivariate probit estimation results for market outlet choices

Variable	Cooperative		Collector		Retailers		Consumers	
	Coef.	RSE	Coef.	RSE	Coef.	RSE	Coef.	RSE
_cons	-2.19***	0.78	0.55	0.69	-2.02***	0.73	-1.80**	0.77
SEX	0.13	0.34	-0.48**	0.31	0.56*	0.31	0.17	0.35
EDUC								
Primary	-0.17	0.30	0.07	0.28	0.14	0.30	0.19	0.31
Secondary	0.25	0.34	0.46	0.33	0.19	0.34	0.08	0.38
Tertiary	0.10	0.48	0.15	0.47	0.26	0.46	0.61	0.50
EXPER	0.09*	0.05	0.01	0.04	-0.03	0.04	0.11**	0.04
FAMSIZE	-0.05	0.06	0.00	0.06	0.00	0.06	0.04	0.07
GLHS	0.31*	0.16	0.11	0.15	0.27*	0.16	-0.17	0.15
MDCOOP	0.93***	0.27	-0.05	0.26	0.18	0.27	-0.31	0.26
DNMP	-0.18	0.14	0.04	0.13	-0.14	0.14	0.00	0.13
NMCO	-0.03	0.08	0.30***	0.10	-0.03	0.09	0.18	0.10
OFFARM(*10 <sup>-4</sup> )	0.12	0.10	-0.13	0.09	0.17*	0.10	-0.01	0.10
FEC	0.05	0.22	-0.54**	0.23	0.58***	0.23	0.51*	0.26
TOF	0.31	0.24	-0.86**	0.24	0.57**	0.25	-0.33	0.25
MAHCON	0.03	0.09	0.03	0.09	-0.16	0.09	0.01	0.09
Predicted Probability		0.45		0.44		0.45		0.43
Joint probability(success)				0.03				
Joint probability(failure)				0.08				
Number of draws (# )				5				
Number of observation			142.00					
Log likelihood			-304.29					
Wald chi2(56)			183.34					
Prob > chi2			0.0000					
Estimated correlation mat								
	$\rho_1$		$\rho_2$		$\rho_3$		$\rho_4$	
$\rho_1$	1							
$\rho_2$	-0.424*** (0.126)		1					
$\rho_3$	-0.660*** (0.106)		-0.107 (0.141)		1			
$\rho_4$	-0.067 (0.139)		0.236** (0.131)		0.017 (0.158)		1	

Likelihood ratio test of:  $\rho_{21} = \rho_{31} = \rho_{41} = \rho_{32} = \rho_{42} = \rho_{43} = 0$

$\chi^2 (6) = 33.3643$  Prob >  $\chi^2 = 0.0000$ \*\*\*

Note: \*\*\*, \*\*, \* significant at 1%, 5%, and 10%, respectively. RSE is Robust standard error,  $\rho_1$  = cooperative,  $\rho_2$  = collectors,  $\rho_3$  = retailers and  $\rho_4$  = consumers

Source: Model result, 2019

**Land size allocated for grazing (GLHS):** The likelihood of choosing cooperative and retailers market outlet was positively relate to the size of land allocated for grazing both at 10% levels of significance. The result indicated that those households who allocated a large size of land for pasture would produce more output and then likely to sell to cooperative and retailer outlets. The result is consistent with the findings of Tadele (2012) who found that owning large land size is suitable for milk production in large quantity and supply to an alternative market that demanded higher quantity with relatively better price.

**Membership to a dairy cooperative:** The primary dairy cooperative membership influenced the likelihood of choosing cooperative market outlet positively and significantly at 1% significance level. The reason behind this is that the farmers who collectively market their produce to markets tend to incur lower transaction costs. This finding is in line with the (Sharma 2016), who stated that the membership is positively related to market choice, that means if a farmer is a member of farmers' group/ association/cooperatives, he/she is likely to participate in modern markets, besides reducing transaction costs, collective marketing empowers farmers to negotiate better trade terms and prices.

**A number of milking cows owned (NMCO):** As expected, the result shows that the number of milking cow increase the likelihood of choosing collectors' outlet at 1% significance level. An increase in the number of milking cow increasing the likelihood of choosing more market outlet. This is because the number of milking cow can directly increase the marketable supply of milk and as milk production increase, farmers' capability to supply increase to more than one channels milk sell outlet. This is in line with the finding of Jaiswal *et al.* (2016) that stated as the number of milk animals' increases, the probability to sell milk to market channel increases all other factors held constant.

**Of farm/Nonfarm income household (OFFARM):** As expected, Access to off/non-farm income has a positively significant on the probability of farmers to sell their product to retail outlet at 10% significance level. Farmers who have access to off/non-farm income have more possibility to choose retailer outlet compared to those who have no access to off/non-farm income. Income from off/non-farm income generating activities enables farmers to purchase different inputs required to produce more milk. Income from off/non-farm strengthens the financial capacity of farmers to improve the production process and enable them to choose an appropriate market channel. Farmers prefer Retailer and consumers, which may far from them and pay a fair price to sell milk. Hence, producers sell the product to the retailer market outlet rather than they might supply for other market outlets. This result disagrees with the finding of Zehrhe (2017) that non-farm income negatively affected selling milk to more outlet.

**Frequency of extension contact (FEC):** Number of extension contact has negative and significant relation with collectors' market outlet at 5% significant level. However, extension contact frequency positive and significant influence with retailer and consumers outlet choice decision at 1% and 10% significance level, respectively. Households who were visited more by extension agent were more likely to deliver milk via retailer and consumers outlets than households less visited by extension agent. Extension contact enables the farmer to improve production means hence leading to more productivity, which in turn more likely to sell milk through retailer and consumers market outlets. This result is in line with the result obtained by Berhanu *et al.* (2013) who found access to dairy extension services positively and significantly affected accessing hotel/restaurant milk market outlet as compared with accessing individual consumer milk market outlet.

**Transport ownership facilities (TOF):** Access to transport ownership facilities influenced the choice of rural collector's outlet negatively and significantly at 5% significant level while transport ownership facilities positively and significantly affect retailer at 5% significant level. Transport ownership facilities by farmers increased the likelihood of choosing another market outlet, which might far market outlets. This might be due to the reason that farmers who have access to the facility could supply their product to urban and sale to retailer or consumer directly by getting a better price that might go to the rural collectors. This shows that the availability of transportation facilities helps to reduce long market distance constraints, offering greater depth in marketing choices. This result is in line with that of Nuri (2016) who found that owning transport facilities influenced the choice of the wholesale outlet positively and significantly.

## Recommendations

Based on the results of this study, the following policy implications are recommended so as to be considered in the future intervention strategies which are aimed at the promotion of dairy production and value chain analysis of milk in the study area in particular.

The result of multivariate probit model analysis shown that collectors channel choice is negatively and significantly influenced by the sex of sampled household as compared to retailer channels choice that affects positively and significantly. This implies that female head household mostly does not participate in far distance market. Therefore, it will be good if policies strengthen the support being given to the female-headed households using different methods like by increasing their awareness through affirmative actions, increasing their participation in different institutions support them on engaging in market participation.

The likelihood of accessing cooperative milk market outlet was positively and significantly influenced by dairy farming experience outlets and membership to a dairy cooperative market outlet. Therefore, farmers should have organized in cooperative and the government should create awareness on the importance of cooperative in order to get financial and technical capability and can solve the problem of searching to their product market sales for fair price outlet. In addition, strengthening the existing farmers' dairy cooperative and establishment of new organizations such as local cooperatives and collective groups supports farmer-to-farmer experience sharing.

The likelihood of accessing retailers and consumers' market outlet were significantly and positively influenced by frequency extension contact as compared to accessing collectors' market outlets that affect significantly and negatively. This implies as farmers access to frequency of extension contact increase, the aptitude to choose good market outlet for the product in terms gaining fair price also increases. Extension services in agriculture are essential and it offers more than just expert assistance in the improvement of production and marketing, it also enables a flow of information and transfer of knowledge and scientific findings to practice that will help farmers in market channel choice. Therefore, strengthening dairy farming extension services should be considered as an important input for producing milk market outlet choice.

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